

Bacteria

I. General characteristics

- A. Most are single celled (there are multicellular cyanobacteria)
- B. Heterotrophic and autotrophic
- C. Prokaryotic

II. Structure

- A. Bacteria
 - 1. Not all bacteria have flagella or capsules (slime layers)

III. Classification

- A. Domain Archaea
 - 1. Chemoautotrophs - thermoacidophiles (love hot and acid), methogens, extreme halophiles (love salt).
- B. Domain Eubacteria
 - 1. Cyanobacteria and most other bacteria.
- C. Eubacteria are classified according to shape, arrangement and chemical activity.
 - 1. There are three basic shapes & three different arrangements. Page 429 (Curtis)
 - a) Coccus (i) = spherical shape
 - (1) **single cocci, diplococci, streptococci and staphylococci**
 - b) Bacillus (i) = rod shaped
 - (1) **single bacillus, diplobacillus and streptobacilli.**
 - (a) Strep throat is caused by a streptobacillus.
 - c) Spirillum (a)

IV. Movement

- A. Many forms have flagella for movement.
- B. Many have a sticky capsule (slime layer) that allows them to attach to their food.

V. Protection

- A. Some produce toxins
- B. Most are protected by numbers.

VI. Feeding and digestion

- A. Bacteria secrete enzymes that digest their food and then they absorb the food back into their cells.
- B. Is this intra- or extracellular digestion?

VII. Classified according to living arrangements.

- A. saprophytic organisms
 - 1. **live on dead things**
 - 2. **Know the difference between a saprophyte and scavenger**
- B. Symbiotic
 - 1. **Parasitic organisms**
 - a) Neisseria gonorrhea
 - 2. **Mutualistic organisms**
 - a) Many of the digestive tract bacteria produce some of the B vitamins and vitamin K
 - 3. **Commensalistic organisms**
 - a) The bacteria living on your skin.

VIII. Growth requirements for bacteria

- A. Proper temperature
 - 1. they like it warm, optimum range is between **26-38°C**
 - 2. But some forms live at below 0°C and as high as 95°C.
- B. Must have moisture
- C. They grow best in the dark.
 - 1. UV light kills bacteria
- D. Must have food (Type of food depends on organism)

IX. Circulation & excretion are accomplished by diffusion

X. Respiration

- A. Obligate aerobes
 - 1. must have oxygen to live
 - 2. Mycobacterium tuberculosis
- B. Obligate anaerobes
 - 1. Can not live in the presence of oxygen
 - 2. Clostridium botulinum
- C. Facultative anaerobes
 - 1. Can grow with or without oxygen
 - 2. e.g. Escherichia coli

XI. Reproduction

- A. Binary fission
- B. Conjugation - bacteria can exchange DNA through small extensions called pili.

XII. Harmful effects of bacteria

- A. Cause diseases and disorders
 - 1. Botulism, Tuberculosis and Gonorrhea *Neisseria gonorrhoeae*
- B. Other problems caused by bacteria
 - 1. Food spoilage (many species)
 - 2. Food poisoning Salmonella sp.
 - 3. Boils, pimples, pneumonia, and meningitis, are all caused by different strains of Staphylococcus aureus
- C. ****Know how microbes cause disease****
- D. Understand the role of antibiotics in treating bacterial diseases.

XIII. Beneficial effects of bacteria

- A. Used to produce food: Yogurt, Cottage cheese, Blue cheese and Vinegar
- B. Tanning of leather and Curing tobacco
- C. Recycle dead organisms
- D. Used as a tool in genetic engineering
- E. Nitrogen fixation

Kingdom Protista Animal Like Protists “Protozoans”

I. General Characteristics

- A. unicellular
- B. not distinctly plant or animal

II. Structure

- A. depends on the phylum
- B. **Know Paramecium**

III. Classification

- A. Protists are classified according to their means of movement.
- B. Zooflagellates (phylum Zoomastigophora), ameboids (phylum Rhizopoda) ciliates (phylum Ciliophora) and the non-motile sporozoans (phylum Apicomplexa).

IV. Digestion

- A. Intracellular
- B. What is the difference between this and bacteria?

V. Circulation, respiration and excretion

- A. Accomplished by diffusion **Why?**

VI. Reproduction

A. Binary fission is the most common form

B. Some reproduce by conjugation

C. Life cycle of Plasmodium vivax

1. Female Anopheles mosquito bites a person with malaria and sucks up the blood which contains gametes of Plasmodium.
2. In the gut of the mosquito the gametes unite to form zygotes
3. The zygotes develop into multinucleated oocysts.
4. The oocysts divide into thousands of sporozoites which invade the salivary glands of the mosquito.
5. When she bites a human she spits a little saliva into the person and along with the saliva go the sporozoites.
6. The sporozoites move through the blood stream and enter liver cells.
7. They multiply in the liver cells and form merozoites.
8. The merozoites then enter red blood cells.
9. They multiply and burst out of the cells every 48 or 72 hours causing a reoccurring fever.

VII. Harmful effects of protozoans

A. Malaria - Plasmodium vivax

B. Amoebic dysentery - Entamoeba histolytica

C. African sleeping sickness - Trypanosoma gambiense

1. The vector is the Tsetse fly.

VIII. Beneficial effects of protozoans

A. Aide in the recycling of dead organic material

B. In termites and other plant eaters protozoans digest cellulose.

Plant Like Protists

“Algae”

I. General Characteristics

A. both unicellular and multicellular forms

B. all contain chlorophyll

C. have no organs or tissues

II. Classification

A. Phylum Chlorophyta

1. "Green algae"

2. Like plants contain chlorophylls a and b and carotene

3. most modern of all algae

4. many are multicellular

5. we believe they gave rise to the plants.

B. Phylum Chrysophyta

1. "Golden algae"

2. most are unicellular

3. inner layer of cell wall is made of pectin and silicon dioxide (glass)

4. Example: Diatoms

C. Phylum Pyrrophyta

1. "Fire algae"

2. Unicellular with flagella

3. Example: Gonyaulax (red tide organism)

4. Noctiluca (fluorescent tides)

D. Phylum Phaeophyta

1. "Brown algae"

2. multicellular

3. Examples: Kelps and sea weeds

E. Phylum Rhodophyta

1. "Red Algae"
2. Multicellular and live in deep waters

F. Euglenophyta

1. Usually have one or two flagella
2. Most are freshwater organisms.
3. Autotrophic

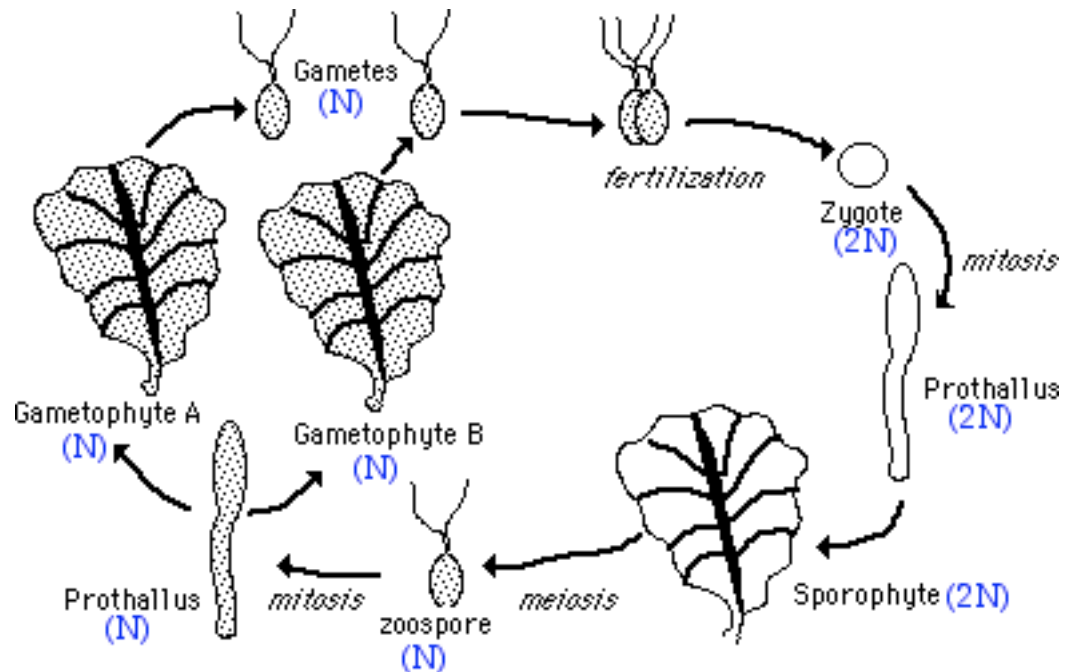
III. Reproduction

A. Asexual

1. fragmentation
2. production of spores

B. Sexual

1. Conjugation in spirogyra
2. Alternation of generations in some green algae



IV. Harmful effects of algae

- A. Water pollution
- B. Eutrophication

V. Beneficial effects

- A. Diatomaceous earth is used for:
 1. filtering material for water filters in pools and aquariums.
 2. polish and scouring powders
 3. tooth paste
- B. Food source for some people
- C. Used to make agar a thickening agent in jellies and other foods.
- D. Forms the base of the food chain in aquatic environments.
- E. Produces a great deal of O₂ for the atmosphere.

Fungus-like Protists

I. Mxyomycota "Plasmodial Slime Molds"

II. Acrasiomycota "Cellular Slime Molds"

III. Oomycota “Mildews and water molds” “The late blight fungus”

Kingdom Fungi

I. General characteristics

- A. Many are multicellular
- B. Parasitic or saprophytic
- C. Cell wall is made of chitin

II. Structure

- A. The sporangiophores, stolons and rhizoids are all types of hypha
- B. All of the hypha together is referred to as the mycelium
- C. What is **coenocytic cell structure**?

III. Classification

A. Division Zygomycota

- 1. spores are stored in spherical structures sporangia on a long stalk called a sporangiophore.
- 2. Examples: Bread mold Rhizopus stolonifer

B. Division Basidiomycota

- 1. Spores are stored in club shaped structures called basidia
- 2. Examples: Mushrooms, smuts and rusts

C. Division Ascomycota

- 1. Spores stored in sack like structures called asci (each ascus contain 8 spores)
- 2. Examples: Aspergillus, Sordaria, mildews, and yeast (a unicellular fungi).

D. Division Deuteromycota

- 1. Do not reproduce sexually
- 2. Penicillium, ring worm and athletes foot.

IV. Protection

- A. Some produce antibiotics to kill bacteria
- B. Why do fungi want to kill bacteria?

V. Feeding

- A. Saprophytic or parasitic

VI. Digestion

- A. Extracellular
- B. Secrete enzymes from the rhizoids and then reabsorb digested nutrients.

VII. Circulation, respiration and excretion

- A. By diffusion
- B. Why?

VIII. Reproduction

- A. Asexual
 - 1. Spores germinates and grows by mitosis
 - 2. Hypha (N) form and specialize
 - 3. Spore case forms and fills with spores
 - 4. Spores are released when spore cased dries and cracks.
 - 5. Why form spores? Why not just keep growing?
- B. Compare sexual reproduction with asexual

IX. Harmful effects

- A. Destroy crops and spoil food - smuts, rusts, mildews and molds.
- B. Cause diseases and other disorders - ring worm, athletes foot, yeast infections in female reproductive tract, etc.

X. Beneficial effects

- A. Help recycle dead organic material
- B. Used in the production of antibiotics, bakery goods and alcoholic beverages and fuel

